

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-290868

(43)Date of publication of application : 05.11.1993

(51)Int.Cl.

H01M 8/04  
H01M 8/24

(21)Application number : 04-087371

(71)Applicant : FUJI ELECTRIC CO LTD

(22)Date of filing : 09.04.1992

(72)Inventor : OGA SHUNSUKE

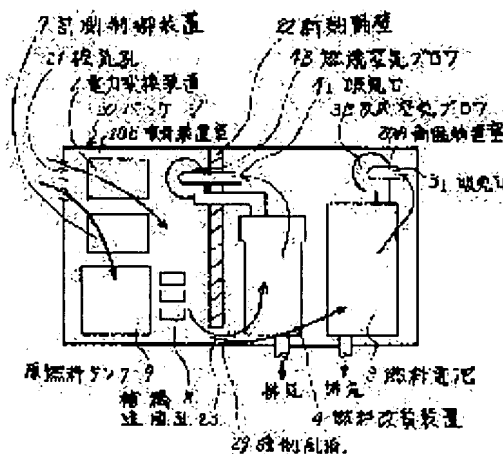
OZAWA YOSHIAKI

## (54) VENTILATION STRUCTURE FOR PACKAGE TYPE FUEL CELL POWER GENERATION DEVICE

(57)Abstract:

**PURPOSE:** To ventilate the inside of a package forcedly without consuming power or heat energy uselessly by parting the inside of the package by a heat insulation partition wall, taking outer air at a room temperature from a ventilation port, and ventilating the inside of an electric device chamber by a forced air current.

**CONSTITUTION:** The inside of a package 20 is parted by a heat insulation partition wall 22. Air taken from a ventilation port 21 formed in an outer wall of an electric device chamber 20B including a power converting device 6 and a measurement control device 7 is introduced to a high temperature device chamber 20A including a fuel cell 3 and a fuel reforming device 4 through a ventilation hole 23. Temperature- increased air is then taken into the high temperature device chamber 20A by blowers 3B, 4B having intake ports 3I, 4I, so the inside of the package 20 is forcedly ventilated by a generated forced air current 29. As a result, thermal effects from a high temperature part to a low temperature part are shielded by the partition wall 22, and an excessive temperature increase can be restricted by the forced air current flowing from the low temperature part to the high temperature part, thereby the inside of the package 20 can be forcedly ventilated without consuming power or heat energy uselessly.



\* NOTICES \*

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the ventilation structure for controlling the temperature rise in the package by the heat leakage from a package mold fuel cell power plant and an especially hot receipt device miniaturized by containing the whole fuel cell power plant in one package.

[0002]

[Description of the Prior Art] Drawing 2 is the block diagram showing an example of the conventional functional order equipment layout of the fuel cell power plant of output 50kw extent. The accessory compartment 1 of a fuel cell power plant It is formed by generation-of-electrical-energy accessory-compartment 1A and control room 1B by the septum 2. To a generation-of-electrical-energy accessory compartment The fuel cell stack 3 and reaction air blower 3B, the fuel reformer 4, and combustion-air blower 4B, The heat devices 5, such as temperature up equipment 5C for heating beforehand cooling-system 5B for holding the fuel cell 3 which are heat utilization equipment 5A which consists of a heat exchanger for collecting exhaust heat of both equipments, and a heating element to a predetermined operating temperature, and a fuel cell to the starting temperature etc., The elevated-temperature section of the power plant with which outside-surface temperature becomes high is contained. Moreover, the low-temperature section of power plants, such as the auxiliary machinery 8, such as the power converter 6 changed and outputted to the alternating current power of a desired electrical potential difference, the measurement control unit 7 which carries out system control of the whole fuel cell power plant, and various pump motors, is contained by control room 1B in the generated output of a fuel cell. Moreover, the receipt device of each \*\* is mutually connected by the pipe line which is not illustrated, and the generation of electrical energy based on electrochemical reaction is performed by supplying fuel gas and reaction air to a fuel cell 2 from the fuel reformer 4 and reaction air blower 3B.

[0003] by the way, the case where a fuel cell 2 is a phosphoric acid form fuel cell -- the reaction temperature -- about 200-degreeC it is -- the temperature of the outside surface of a fuel cell -- about 180-degreeC It reaches. moreover, original fuels, such as natural gas and a methanol, -- hydrogen -- the fuel reforming machine reformed to rich fuel gas -- a burner -- having -- the temperature of the outside surface -- 300-degreeC Also above, it may reach. Furthermore, heat devices which have an auxiliary burner etc., such as temperature up equipment and heat utilization equipment of exhaust gas, also become an elevated temperature with the remarkable temperature of the outside surface. On the other hand, it is necessary to hold below to a regular allowable temperature, respectively, and to prevent the fall of the engine performance by the temperature rise, and a life property, and, for this reason, electric apparatus, such as equipment including electronic circuitries, such as a power converter 6 and the measurement control unit 7, and the auxiliary machinery 8 containing a drive motor, are usually for example, 40-degreeC about ambient temperature. Holding below is called for. Then, while carrying out the heat insulation of accessory-compartment 1A and the control room 1B by the septum 2 which has adiathermic and holding the temperature in control room for each \*\* to the above-mentioned ambient temperature forced ventilation or by carrying out free convection ventilation, respectively, it is

constituted so that allowances may be given to the equipment layout in generation-of-electrical-energy accessory-compartment 1A and the unusual rise of whenever [ room air temperature ] may be prevented.

[0004] On the other hand, the ventilation structure for preventing the thermal effect from the elevated-temperature section to the low-temperature section becomes especially comparatively, important, since the package mold fuel cell power plant of number of capacity 10kw extent which contained this to the fuel cell power plant of small capacity at the package, and was used as the power unit of for example, an assembly transportation mold or a portable type a miniaturization and by making it space-saving is known and the elevated-temperature section and the low-temperature section are contained in a narrow package in this case.

[0005] Drawing 3 is the elevation in which, and showing it. The package 10 of a metal-clad mold to one side-attachment-wall side A ventilating fan 12, [ the conventional ventilation structure of a package mold fuel cell power plant ] [ \*\* ] [ type ] The side-attachment-wall side which counters this is equipped with an exhaust port 13. Electric system, such as the power converter 6 to be controlled [ of ambient temperature ], the measurement control unit 7, and auxiliary machinery 8, Furthermore, the original fuel tanks 9, such as methyl alcohol the compulsion produced from a ventilating fan 12 towards an exhaust port 13 -- elegant, while being contained by the windward of 19 and keeping the ambient temperature low The high fuel cell 3, the fuel reformer 4, and the heat device that is not illustrated of skin temperature compulsion -- elegant -- the compulsion to which it was contained on the leeward of 19, heat exchange was carried out on the front face, and temperature rose -- elegant -- by emitting 19 outside quickly from an exhaust port 13, it is constituted so that the rise of the temperature in a package 10 may be controlled. Moreover, it is constituted by the original fuel tank 9 with the need of stopping especially ambient temperature so that forced cooling of the cooling fan 14 may be formed and carried out. furthermore, reaction air blower 3B and combustion-air blower 4B -- each inlet 3I And 4I while preparing in the exterior of a package 10 and inhaling the open air -- exhaust-port 3O of a fuel cell 3 and the fuel reformer 4 And 4O It is constituted so that it may prepare in the exterior of a package and hot exhaust air may be emitted outside.

[0006]

[Problem(s) to be Solved by the Invention] The whole fuel cell power plant is contained in one package, it miniaturizes, and there is a fault which prevents the rise of ambient temperature that the thermal effect which the fuel cell and the radiant heat from a fuel reformer with which outside-surface temperature exceeds 200 degreeec have on electric system or a original fuel tank in the conventional package mold fuel cell power plant cannot prevent, forced ventilation or by carrying out local compulsion air blast quenching. Moreover, in order to consume power for forced ventilation and compulsive air blast quenching, the problem that the system efficiency of the whole fuel cell power plant falls is also generated. Furthermore, in order to emit so much forced ventilation and the air to which temperature rose by compulsive air blast quenching to the exterior of a package, while having a bad influence on an environment, the problem that system efficiency falls further is also generated by consuming heat energy vainly.

[0007] The purpose of this invention can carry out forced ventilation of the inside of a package, without consuming power and heat energy vainly, and is to obtain the package mold fuel cell power plant equipped with the cooling structure where the thermal effect to a control system etc. can be prevented.

[0008]

[Means for Solving the Problem] The fuel reformer and reaction air blower which supply fuel gas and reaction air to a fuel cell and this according to this invention in order to solve the above-mentioned technical problem, In what the fuel cell power plant containing the power converter arranged on the output side of said fuel cell and the measurement control device which controls the whole system was contained by one package, and unified The heat insulation septum formed in the electric-apparatus room containing the elevated-temperature accessory compartment which includes the inside of said package for said fuel cell and a fuel reformer, said power converter, and a measurement control unit, and the ventilating hole formed in this heat insulation septum, It shall come to have the ventilating hole formed

in the outer wall of said electric-apparatus room, and the inlet of the blower which inhales the air to which it was located in said elevated-temperature equipment interior of a room, it flowed into the elevated-temperature accessory compartment through said ventilating hole and air hole, and temperature rose.

[0009] Moreover, the inlet of a blower shall be an inlet of the thing which is the inlet of the reaction air blower which supplies reaction air to a fuel cell, or the combustion-air blower which supplies a combustion air to the burner of a fuel reformer.

[0010]

[Function] The elevated-temperature accessory compartment which includes the inside of a package for a fuel cell and a fuel reformer by the heat insulation septum in the configuration of this invention, Form in the electric-apparatus room containing a power converter and a measurement control unit, and the air inhaled from the ventilating hole formed in the outer wall of an electric-apparatus room is led to an elevated-temperature accessory compartment through the ventilating hole formed in the heat insulation septum. By having considered as the ventilation structure of inhaling the air to which temperature rose by the blower which has an inlet in the elevated-temperature equipment interior of a room, for example, a reaction air blower, and the combustion-air blower An electric-apparatus room can carry out forced cooling of the low-temperature sections, such as a power converter and a measurement control unit, by the open air of the ordinary temperature which the thermal effect which contains the radiant heat from an elevated-temperature accessory compartment by the heat insulation septum was intercepted, and was inhaled from the ventilating opening. Moreover, by inhaling the style of the compulsive style to which heat exchange was carried out to the elevated-temperature sections, such as a hot fuel cell and a fuel reformer, and temperature rose by elevated-temperature equipment indoor and established a reaction air blower or a combustion-air blower Since a fuel cell and the emission heat energy of a fuel reformer are collected and it can use effectively for the preheating of reaction air or a combustion air while being able to generate the style of the compulsive style, without consuming the auxiliary machinery power for ventilation, the high package mold fuel cell power plant of thermal efficiency can be obtained.

[0011]

[Example] Hereafter, this invention is explained based on an example. Drawing 1 is the elevation simplifying and showing the package mold fuel cell power plant which becomes the example of this invention, and omits the duplicate explanation by giving the same reference mark to the same component as the conventional technique. In drawing, the ventilating hole 21 which the package 20 of a metal-clad mold is formed by elevated-temperature accessory-compartment 20A and electric-apparatus room 20B by the heat insulation septum 22 by which the interior has a ventilating hole 23, and adopts the open air in the outer wall of electric-apparatus room 20B is formed. Moreover, in elevated-temperature accessory-compartment 20A, outside-surface temperature, such as a fuel cell 3, the fuel reformer 4, or a heat device that is not illustrated, is 200-degreeC. While the elevated-temperature section of the power plant used as the elevated temperature to exceed is contained Inlet 3I of reaction air blower 3B which supplies reaction air to a fuel cell, and inlet 4I of combustion-air blower 4B which supplies a combustion air to a reforming mind burner it allots -- having -- a ventilating hole 21 and a ventilating hole 23 -- going -- inlet 3I of a blower, and 4I the resulting compulsion -- elegant -- the ventilation structure of generating 29 is formed. Furthermore, electrical machinery and apparatus, such as the power converter 6 which needs control of ambient temperature, the measurement control unit 7, or auxiliary machinery 8, and the low-temperature section of a original fuel tank 9 grade power plant are contained by electric-apparatus room 20B.

[0012] Thus, in the constituted package mold fuel cell power plant, the thermal effect in which electric-apparatus room 20B contains the radiant heat from elevated-temperature accessory-compartment 20A by the heat insulation septum 22 is intercepted. And the open air of ordinary temperature is inhaled from a ventilating hole 21, forced ventilation of the electric-apparatus interior of a room is carried out, and it is for example, 40-degreeC about ambient temperature, such as a power converter 6, the measurement control unit 7, auxiliary machinery 8, and the original fuel tank 9. Since it is below controllable The temperature rise of a receipt device can be held below to each allowable temperature, and the fall of the

engine performance or a life property can be prevented.

[0013] moreover, the compulsion to which the ventilating hole 23 of the heat insulation septum 22 was passed, heat exchange was carried out to the fuel cell hot within elevated-temperature accessory-compartment 20A, and the fuel reformer, and temperature rose -- elegant -- inlet 3I of reaction air blower 3B existing [ in elevated-temperature accessory-compartment 20A ] in 29, or combustion-air blower 4B Or 4I It is used as the reaction air by which the preheating was inhaled and carried out, or a combustion air. therefore -- without it consumes the auxiliary machinery power needed since a ventilating fan and a cooling fan were driven conventionally -- compulsion -- elegant -- since a fuel cell 3 and the emission heat energy of the fuel reformer 4 are collected and it can use effectively as preheating energy of reaction air or a combustion air while generating 29 and being able to perform forced ventilation, the high package mold fuel cell power plant of thermal efficiency can be obtained as the whole power plant. furthermore, the compulsion used as hot blast -- elegant -- since 29 is not emitted to the exterior of a package 20, the package mold fuel cell power plant which did not have a bad influence on an environment and harnessed the description of the fuel cell as a source of clean energy can be obtained.

[0014]

[Effect of the Invention] This invention forms the interior of a package in an elevated-temperature accessory compartment and an electric-apparatus room as mentioned above by the heat insulation septum which has a ventilating hole. Become elegant and it flows. and the air of the ordinary temperature which cooled electrical machinery and apparatus, such as a power converter which prepared the ventilating hole which adopts the open air in the outer wall of an electric-apparatus room, and was contained in the electric-apparatus room, a measurement control unit, or auxiliary machinery, -- an air hole -- passing -- an elevated-temperature accessory compartment -- compulsion -- Ventilation structure was constituted so that the style of the compulsive style to which heat exchange was carried out to equipment with high skin temperature, such as a fuel cell and a fuel reformer, and temperature rose might be inhaled from the inlet of an established reaction air blower and a combustion-air blower. Consequently, since an extremes-of-temperature rise can be controlled by the style of the compulsive style which the thermal effect from the elevated-temperature section to the low-temperature section which became a problem with the conventional package mold fuel cell power plant miniaturized by containing the whole power plant in a package is intercepted by the heat insulation septum, and flows in the elevated-temperature section from the low-temperature section, the miniaturized package mold fuel cell power plant reliable over a long period of time can be offered.

[0015] Moreover, while the ventilating fan and cooling fan which were conventionally needed by having used an established reaction air blower and an established combustion-air blower as a source of power of the style of the compulsive style become unnecessary and being able to reduce the consumption of the part auxiliary machinery power Since a fuel cell and the stripping heat energy of a fuel reformer can be used effectively for the preheating of reaction air or a combustion air It becomes possible to prevent decline in the system efficiency which became a problem with the conventional ventilation structure, and there is little consumption of auxiliary machinery power and it can offer economically and advantageously the good package mold fuel cell power plant of heat balance.

[0016] Furthermore, since ventilation structure does not emit hot blast to the exterior of a package, the package mold fuel cell power plant which did not have a bad influence on the environment and harnessed the description as a source of clean energy can be offered.

---

[Translation done.]

\* NOTICES \*

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]

[Claim 1] A fuel cell, and the fuel reformer and reaction air blower which supply fuel gas and reaction air to this, In what the fuel cell power plant containing the power converter arranged on the output side of said fuel cell and the measurement control device which controls the whole system was contained by one package, and unified The heat insulation septum formed in the electric-apparatus room containing the elevated-temperature accessory compartment which includes the inside of said package for said fuel cell and a fuel reformer, said power converter, and a measurement control unit, and the ventilating hole formed in this heat insulation septum, Ventilation structure of the package mold fuel cell power plant characterized by coming to have the ventilating hole formed in the outer wall of said electric-apparatus room, and the inlet of the blower which inhales the air to which it was located in said elevated-temperature equipment interior of a room, it flowed into the elevated-temperature accessory compartment through said ventilating hole and air hole, and temperature rose.

[Claim 2] Ventilation structure of a package mold fuel cell power plant according to claim 1 where the inlet of a blower is characterized by being the inlet of the reaction air blower which supplies reaction air to a fuel cell.

[Claim 3] Ventilation structure of a package mold fuel cell power plant according to claim 1 where the inlet of a blower is characterized by being the inlet of the combustion-air blower which supplies a combustion air to the burner of a fuel reformer.

---

[Translation done.]